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Data Summary Tables on the Effects of Specific Maintenance Types on the Emissions from In-Use Light Duty Vehicles Failing Idle Test Cutpoints

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16. ABSTRACT

The tables in this report were compiled from data selected from the computer data records from several testing programs. Except in the Portland Study NOx Analysis Tables, only vehicles which received at least one repair and retest sequence were selected from the testing programs for summary in this report. No effort was made to create a sample which would contain a specific mix of model years or vehicle types. Caution should be used in extrapolating any measured changes from this report to real world changes which might be observed in an in-use fleet.

Vehicles which did not receive all test sequences in prog[redacted]ams with more than one repair and retest step have had their emission levels from their previous test sequence carried forward to any missing test sequence. This reflects the fact that the repair in the missing sequence was not judged as necessary in the testing program and therefore the previous test sequence would represent the properly "repaired" emission levels of that vehicle for the missing test sequence.

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December, 1980

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Technical Reports do not necessarily represent final EPA decisions or positions. They are intended to present technical analysis of issues using data which are currently available. The purpose in the release of such reports is to facilitate the exchange of technical information and to inform the public of technical developments which may form the basis for a final EPA decision, position or regulatory action.

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The Tables in this report were compiled from data selected from the computer data records from several testing programs. Except in the Portland Study NOx Analysis Tables, only vehicles which received at least one repair and retest sequence were selected from the testing programs for summary in this report. No effort was made to create a sample which would contain a specific mix of model years or vehicle types. Caution should be used in extrapolating any measured changes from this report to real world changes which might be observed in an in-use fleet.

Vehicles which did not receive all test sequences in programs with more than one repair and retest step have had their emission levels from their previous test sequence carried forward to any missing test sequence. This reflects the fact that the repair in the missing sequence was not judged as necessary in the testing program and therefore the previous test sequence would represent the properly "repaired" emission levels of that vehicle for the missing test sequence. This assumption affects Tables 1 through 6.

The "as-received" column in Tables 1 through 18 represent the emissions and rates for only those vehicles which received at least one repair and retest sequence in the testing program. This may not reflect the overall emission levels and rates for the test program sample as a whole.

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Table 1.
Restorative Maintenance Sample
(195 1975-1976 Model Year Vehicles)

Average Mileage: 8070 Miles

Idle HC Cutpoint: 225 PPM
Idle CO Cutpoint: 1.0 %

(Idle Scores Measured in Neutral or Park Gear)

	As Received (195 Vehicles)[5]	Vehicles Which Fail Idle Test As Received (95 Vehicles)[4]			
		RECV	AFT2[1]	AFT3[2]	AFT4[3]
Idle Test:					
Average Idle HC (PPM)	158.1	281.1	255.6	82.7	76.9
Average Idle CO (%)	1.86	3.70	3.21	.28	.30
IHC Pass Rate (%)	75.9	50.5	57.9	93.7	94.7
ICO Pass Rate (%)	52.8	3.2	15.8	90.5	91.6
Idle Test Pass Rate (%)	51.3	0.0	9.5	87.4	88.4
Federal Test Procedure:					
Average FTP HC (GM/MI)	1.64	2.32	2.13	1.09	1.02
Average FTP CO (GM/MI)	28.0	46.3	41.1	11.7	10.7
Average FTP NO (GM/MI)	3.11	2.75	2.49	2.61	2.46
FTP HC Pass Rate (%)	56.9	26.3	35.8	84.2	89.5
FTP CO Pass Rate (%)	41.0	7.4	12.6	82.1	87.4
FTP NO Pass Rate (%)	56.9	72.6	85.3	88.4	92.6
FTP Test Pass Rate (%)	11.3	2.1	9.5	66.3	75.8
Highway Fuel Economy Test:					
Average HFET HC (GM/MI)	.37	.47	.44	.27	.25
Average HFET CO (GM/MI)	4.75	7.68	6.81	3.72	3.18
Average HFET NO (GM/MI)	3.55	3.34	3.04	3.05	2.89
Clayton Key Mode:					
High Cruise HC (PPM)	37.7	42.7	39.5	34.6	32.8
High Cruise CO (%)	.114	.182	.164	.144	.131
High Cruise NO (PPM)	1346	1335	1211	1234	1145
Low Cruise HC (PPM)	42.6	50.1	46.5	37.2	36.4
Low Cruise CO (%)	.126	.186	.150	.048	.071
Low Cruise NO (PPM)	897	927	814	845	764

1: After correction of any disablements and maladjustments other than idle air/fuel mixture and idle speed.*

2: After adjustment of idle speed and idle air/fuel mixture.*

3: After replacement of any defective components and a major tune-up.*

4: Some vehicles do not complete all test sequences. The emission values for these vehicles are carried forward from the previously completed test sequence.

5: The total Restorative Maintenance program included 300 1975-1976 vehicles. These 195 vehicles are those which have received at least one additional test sequence besides the as-received tests.

* All repairs performed by laboratory mechanics.

Table 2.
Restorative Maintenance Sample
(195 1975-1976 Model Year Vehicles)

Average Mileage: 8070 Miles

Idle HC Cutpoint: 300 PPM
Idle CO Cutpoint: 3.0 %
(Idle Scores Measured in Neutral or Park Gear)

	As Received (195 Vehicles)[5]	Vehicles Which Fail Idle Test As Received (64 Vehicles)[4]			
		RECV	AFT2[1]	AFT3[2]	AFT4[3]
Idle Test:					
Average Idle HC (PPM)	158.1	362.9	322.2	97.0	94.0
Average Idle CO (%)	1.86	4.60	3.86	.33	.35
IHC Pass Rate (%)	81.5	28.1	40.6	92.2	92.2
ICO Pass Rate (%)	70.8	3.1	17.2	87.5	90.6
Idle Test Pass Rate (%)	67.2	0.0	9.4	84.4	85.9
Federal Test Procedure:					
Average FTP HC (GM/MI)	1.64	2.62	2.32	1.12	1.06
Average FTP CO (GM/MI)	28.0	52.6	45.2	12.5	11.1
Average FTP NO (GM/MI)	3.11	2.75	2.40	2.59	2.41
FTP HC Pass Rate (%)	56.9	12.5	25.0	79.7	85.9
FTP CO Pass Rate (%)	41.0	4.7	12.5	79.7	85.9
FTP NO Pass Rate (%)	56.9	78.1	93.8	92.2	95.3
FTP Test Pass Rate (%)	11.3	1.6	10.9	65.6	75.0
Highway Fuel Economy Test:					
Average HFET HC (GM/MI)	.37	.53	.48	.28	.26
Average HFET CO (GM/MI)	4.75	8.91	7.73	4.50	3.66
Average HFET NO (GM/MI)	3.55	3.37	2.97	3.06	2.83
Clayton Key Mode:					
High Cruise HC (PPM)	37.7	51.7	46.2	38.6	37.3
High Cruise CO (%)	.114	.240	.213	.187	.165
High Cruise NO (PPM)	1346	1516	1333	1386	1265
Low Cruise HC (PPM)	42.6	60.9	55.0	40.9	41.6
Low Cruise CO (%)	.126	.248	.196	.050	.079
Low Cruise NO (PPM)	897	1037	872	937	841

1: After correction of maladjustments and disablements other than idle air/fuel mixture and idle speed.*

2: After adjustment of idle speed and idle air/fuel mixture.*

3: After replacement of any defective components and a major tune-up.*

4: Some vehicles do not complete all test sequences. The emission values for these vehicles are carried forward from the previously completed test sequence.

5: The total Restorative Maintenance program included 300 1975-1976 vehicles. These 195 vehicles are those which have received at least one additional test sequence besides the as-received tests.

* All repairs performed by laboratory mechanics.

Table 3.

Emission Factor FY77 Sample
(71 1975-1979 Model Year Vehicles)

Average Mileage: 25003 Miles

Idle HC Cutpoint: 225 PPM
Idle CO Cutpoint: 1.0 %

	As Received (71 Vehicles)[1]	Vehicles Which Fail Idle Test As Received (54 Vehicles)	
		As Received	After Maintenance[2]
Idle Test:			
Average Idle HC (PPM)	397.3	499.7	241.5
Average Idle CO (%)	3.55	4.59	.42
IHC Pass Rate (%)	39.4	20.4	68.5
ICO Pass Rate (%)	32.4	11.1	87.0
Idle Test Pass Rate (%)	23.9	0.0	59.3
Federal Test Procedure:			
Average FTP HC (GM/MI)	2.44	2.75	1.43
Average FTP CO (GM/MI)	37.8	42.2	14.6
Average FTP NO (GM/MI)	2.06	2.10	2.10
FTP HC Pass Rate (%)	25.4	13.0	70.4
FTP CO Pass Rate (%)	12.7	9.3	72.2
FTP NO Pass Rate (%)	70.4	70.4	75.9
FTP Test Pass Rate (%)	1.4	0.0	40.7
Highway Fuel Economy Test:			
Average HFET HC (GM/MI)	.71	.73	.51
Average HFET CO (GM/MI)	9.54	8.76	6.48
Average HFET NO (GM/MI)	2.55	2.54	2.29
Federal 3-Mode Test:	(20 Vehicles)[3]	(10 Vehicles)[3]	
High Cruise HC (PPM)	100.5	95.4	74.1
High Cruise CO (%)	.409	.244	.456
High Cruise NO (PPM)	720	867	730
Low Cruise HC (PPM)	98.7	87.4	116.9
Low Cruise CO (%)	.507	.352	.410
Low Cruise NO (PPM)	824	865	788

1: Those vehicles in the FY77 Emission Factor Program which were tested after only carburetor air/fuel mixture related repairs.*

2: Adjustment of the carburetor air/fuel mixture and related adjustment (timing, idle speed).*

3: Only some of the vehicles selected for this analysis also received the loaded mode testing.

* All repairs performed by laboratory mechanics.

Table 4.

Emission Factor FY77 Sample
(71 1975-1979 Model Year Vehicles)

Average Mileage: 25003 Miles

Idle HC Cutpoint: 300 PPM
Idle CO Cutpoint: 3.0 %

	As Received (71 Vehicles)[1]	Vehicles Which Fail Idle Test As Received (44 Vehicles)	
		As Received	After Maintenance[2]
Idle Test:			
Average Idle HC (PPM)	397.3	572.8	242.6
Average Idle CO (%)	3.55	5.30	.38
IHC Pass Rate (%)	50.7	20.5	81.8
ICO Pass Rate (%)	49.3	18.2	100.0
Idle Test Pass Rate (%)	38.0	0.0	81.8
Federal Test Procedure:			
Average FTP HC (GM/MI)	2.44	2.98	1.42
Average FTP CO (GM/MI)	37.8	47.6	15.2
Average FTP NO (GM/MI)	2.06	1.91	1.94
FTP HC Pass Rate (%)	25.4	6.8	72.7
FTP CO Pass Rate (%)	12.7	6.8	68.2
FTP NO Pass Rate (%)	70.4	75.0	79.5
FTP Test Pass Rate (%)	1.4	0.0	45.5
Highway Fuel Economy Test:			
Average HFET HC (GM/MI)	.71	.74	.48
Average HFET CO (GM/MI)	9.54	9.41	6.88
Average HFET NO (GM/MI)	2.55	2.20	1.97
Federal 3-Mode Test:	(20 Vehicles)[3]	(9 Vehicles)[3]	
High Cruise HC (PPM)	100.5	100.6	77.0
High Cruise CO (%)	.409	.231	.462
High Cruise NO (PPM)	720	867	724
Low Cruise HC (PPM)	98.7	85.3	118.1
Low Cruise CO (%)	.507	.380	.442
Low Cruise NO (PPM)	824	814	758

1: Those vehicles in the FY77 Emission Factor Program which were tested after only carburetor air/fuel mixture related repairs.*

2: Adjustment of the carburetor air/fuel mixture and related adjustment (timing, idle speed).*

3: Only some of the vehicles selected for this analysis also received the loaded mode testing.

* All repairs performed by laboratory mechanics.

Table 4.

Emission Factor FY77 Sample
(71 1975-1979 Model Year Vehicles)

Average Mileage: 25003 Miles

Idle HC Cutpoint: 300 PPM
Idle CO Cutpoint: 3.0 %

	As Received (71 Vehicles)[1]	Vehicles Which Fail Idle Test As Received (44 Vehicles)	
		As Received	After Maintenance[2]
Idle Test:			
Average Idle HC (PPM)	397.3	572.8	242.6
Average Idle CO (%)	3.55	5.30	.38
IHC Pass Rate (%)	50.7	20.5	81.8
ICO Pass Rate (%)	49.3	18.2	100.0
Idle Test Pass Rate (%)	38.0	0.0	81.8
Federal Test Procedure:			
Average FTP HC (GM/MI)	2.44	2.98	1.42
Average FTP CO (GM/MI)	37.8	47.6	15.2
Average FTP NO (GM/MI)	2.06	1.91	1.94
FTP HC Pass Rate (%)	25.4	6.8	72.7
FTP CO Pass Rate (%)	12.7	6.8	68.2
FTP NO Pass Rate (%)	70.4	75.0	79.5
FTP Test Pass Rate (%)	1.4	0.0	45.5
Highway Fuel Economy Test:			
Average HFET HC (GM/MI)	.71	.74	.48
Average HFET CO (GM/MI)	9.54	9.41	6.88
Average HFET NO (GM/MI)	2.55	2.20	1.97
Federal 3-Mode Test:	(20 Vehicles)[3]	(9 Vehicles)[3]	
High Cruise HC (PPM)	100.5	100.6	77.0
High Cruise CO (%)	.409	.231	.462
High Cruise NO (PPM)	720	867	724
Low Cruise HC (PPM)	98.7	85.3	118.1
Low Cruise CO (%)	.507	.380	.442
Low Cruise NO (PPM)	824	814	758

1: Those vehicles in the FY77 Emission Factor Program which were tested after only carburetor air/fuel mixture related repairs.*

2: Adjustment of the carburetor air/fuel mixture and related adjustment (timing, idle speed).*

3: Only some of the vehicles selected for this analysis also received the loaded mode testing.

* All repairs performed by laboratory mechanics.

Table 5.
Emission Factor FY79 Sample
(91 1975-1980 Model Year Vehicles)

Average Mileage: 20020 Miles

Idle HC Cutpoint: 225 PPM
Idle CO Cutpoint: 1.0 %

	As Received (91 Vehicles)[5]	Vehicles Which Fail Idle Test As Received (43 Vehicles)[4]			
		RECV	AFT2[1]	AFT3[2]	AFT4[3]
Idle Test:					
Average Idle HC (PPM)	189.7	350.5	319.0	159.6	119.8
Average Idle CO (%)	2.02	4.13	3.61	.64	.58
IHC Pass Rate (%)	73.6	44.2	48.8	88.4	86.0
ICO Pass Rate (%)	56.0	7.0	16.3	88.4	86.0
Idle Test Pass Rate (%)	52.7	0.0	9.3	79.1	76.7
Federal Test Procedure:					
Average FTP HC (GM/MI)	1.75	2.10	1.93	1.27	1.17
Average FTP CO (GM/MI)	27.6	33.7	28.4	13.7	13.2
Average FTP NO (GM/MI)	2.21	2.05	1.96	2.04	2.03
FTP HC Pass Rate (%)	47.3	14.0	39.5	74.4	74.4
FTP CO Pass Rate (%)	31.9	20.9	30.2	60.5	67.4
FTP NO Pass Rate (%)	58.2	67.4	69.8	69.8	72.1
FTP Test Pass Rate (%)	0.0	0.0	7.0	39.5	44.2
Highway Fuel Economy Test:					
Average HFET HC (GM/MI)	.42	.50	.45	.35	.34
Average HFET CO (GM/MI)	6.41	6.41	5.23	3.78	3.79
Average HFET NO (GM/MI)	2.67	2.49	2.45	2.43	2.41
Federal 3-Mode:	(30 Vehicles)[6]	----------(19 Vehicles)[6]----------			
High Cruise HC (PPM)	40.1	52.2	44.5	27.5	28.3
High Cruise CO (%)	.112	.121	.077	.071	.071
High Cruise NO (PPM)	950	874	704	716	739
Low Cruise HC (PPM)	56.7	73.5	63.8	35.9	35.7
Low Cruise CO (%)	.385	.463	.422	.235	.221
Low Cruise NO (PPM)	681	667	504	511	508

1: After correction of any disablements and maladjustments other than idle air/fuel mixture and idle speed.*

2: After adjustment of idle speed and idle air/fuel mixture.*

3: After replacement of any defective components and a major tune-up.*

4: Some vehicles do not complete all test sequences. The emission values for these vehicles are carried forward from the previously completed test sequence.

5: Only those vehicles in the FY79 Emission Factor Program which received at least one of the subsequent repair sequences were chosen for this analysis.

6: Only some of the vehicles selected for this analysis also received the loaded-mode testing.

* All repairs performed by laboratory mechanics.

Table 6.
Emission Factor FY79 Sample
(91 1975-1980 Model Year Vehicles)

Average Mileage: 20020 Miles

Idle HC Cutpoint: 300 PPM
Idle CO Cutpoint: 3.0 %

	As Received (91 Vehicles)[5]	Vehicles Which Fail Idle Test As Received (28 Vehicles)[4]			
		RECV	AFT2[1]	AFT3[2]	AFT4[3]
Idle Test:					
Average Idle HC (PPM)	189.7	465.9	426.5	209.3	145.0
Average Idle CO (%)	2.02	5.41	4.75	.92	.82
IHC Pass Rate (%)	78.0	28.6	46.4	89.3	85.7
ICO Pass Rate (%)	74.7	17.9	32.1	85.7	89.3
Idle Test Pass Rate (%)	69.2	0.0	14.3	78.6	78.6
Federal Test Procedure:					
Average FTP HC (GM/MI)	1.75	2.33	2.09	1.34	1.18
Average FTP CO (GM/MI)	27.6	36.2	28.7	13.0	12.6
Average FTP NO (GM/MI)	2.21	1.90	1.96	2.06	2.04
FTP HC Pass Rate (%)	47.3	35.7	39.3	75.0	75.0
FTP CO Pass Rate (%)	31.9	28.6	35.7	64.3	75.0
FTP NO Pass Rate (%)	58.2	78.6	71.4	71.4	71.4
FTP Test Pass Rate (%)	0.0	0.0	3.6	42.9	50.0
Highway Fuel Economy Test:					
Average HFET HC (GM/MI)	.42	.46	.39	.29	.30
Average HFET CO (GM/MI)	6.41	4.45	3.25	1.82	2.14
Average HFET NO (GM/MI)	2.67	2.29	2.47	2.43	2.39
Federal 3-Mode:	(30 Vehicles)[6]	----------(12 Vehicles)[6]----------			
High Cruise HC (PPM)	40.1	61.6	54.9	33.8	33.8
High Cruise CO (%)	.112	.068	.058	.058	.055
High Cruise NO (PPM)	950	813	774	784	816
Low Cruise HC (PPM)	56.7	79.3	62.0	38.4	35.9
Low Cruise CO (%)	.385	.273	.188	.140	.111
Low Cruise NO (PPM)	681	674	576	584	598

1: After correction of any disablements and maladjustments other than idle air/fuel mixture and idle speed.*

2: After adjustment of idle speed and idle air/fuel mixture.*

3: After replacement of any defective components and a major tune-up.*

4: Some vehicles do not complete all test sequences. The emission values for these vehicles are carried forward from the previously completed test sequence.

5: Only those vehicles in the FY79 Emission Factor Program which received at least one of the subsequent repair sequences were chosen for this analysis.

6: Only some of the vehicles selected for this analysis also received the loaded-mode testing.

* All repairs performed by laboratory mechanics.

Table 7.
Portland Element II Sample
(16 1972-1974 Model Year Vehicles
Which Received Only Carburetor Maintenance)

Average Mileage: 50970 Miles

Idle HC Cutpoint: 225 PPM
Idle CO Cutpoint: 1.0 %

	As Received (16 Vehicles)	Vehicles Which Fail Idle Test As Received (16 Vehicles)	
		As Received	After Carb. Maintenance*
Idle Test:			
Average Idle HC (PPM)	465.9	465.9	260.9
Average Idle CO (%)	5.01	5.01	1.06
IHC Pass Rate (%)	37.5	37.5	62.5
ICO Pass Rate (%)	6.3	6.3	62.5
Idle Test Pass Rate (%)	0.0	0.0	43.8
Federal Test Procedure:			
Average FTP HC (GM/MI)	3.53	3.53	4.35
Average FTP CO (GM/MI)	61.7	61.7	36.2
Average FTP NO (GM/MI)	2.87	2.87	3.28
FTP HC Pass Rate (%)	50.0	50.0	68.8
FTP CO Pass Rate (%)	6.3	6.3	68.8
FTP NO Pass Rate (%)	75.0	75.0	75.0
FTP Test Pass Rate (%)	0.0	0.0	31.3
Highway Fuel Economy Test:			
Average HFET HC (GM/MI)	2.25	2.25	2.33
Average HFET CO (GM/MI)	21.44	21.44	13.87
Average HFET NO (GM/MI)	4.24	4.24	4.75

* Repairs performed by field mechanics.

Table 8.
Portland Element II Sample
(16 1972-1974 Model Year Vehicles
Which Received Only Carburetor Maintenance)

Average Mileage: 50970 Miles

Idle HC Cutpoint: 300 PPM
Idle CO Cutpoint: 3.0 %

	As Received (16 Vehicles)	Vehicles Which Fail Idle Test As Received (15 Vehicles)	
		As Received	After Carb. Maintenance*
Idle Test:			
Average Idle HC (PPM)	465.9	492.0	272.0
Average Idle CO (%)	5.01	5.17	1.07
IHC Pass Rate (%)	37.5	33.3	80.0
ICO Pass Rate (%)	12.5	6.7	93.3
Idle Test Pass Rate (%)	6.3	0.0	73.3
Federal Test Procedure:			
Average FTP HC (GM/MI)	3.53	3.50	4.50
Average FTP CO (GM/MI)	61.7	57.8	35.7
Average FTP NO (GM/MI)	2.87	2.86	3.27
FTP HC Pass Rate (%)	50.0	53.3	66.7
FTP CO Pass Rate (%)	6.3	6.7	73.3
FTP NO Pass Rate (%)	75.0	80.0	80.0
FTP Test Pass Rate (%)	0.0	0.0	33.3
Highway Fuel Economy Test:			
Average HFET HC (GM/MI)	2.25	2.32	2.44
Average HFET CO (GM/MI)	21.44	19.81	14.12
Average HFET NO (GM/MI)	4.24	4.29	4.76

* Repairs performed by field mechanics.

Table 9.
Portland Element II Sample
(26 1975-1977 Model Year Vehicles
Which Received Only Carburetor Maintenance)

Average Mileage: 29821 Miles

Idle HC Cutpoint: 225 PPM
Idle CO Cutpoint: 1.0 %

	As Received (26 Vehicles)	Vehicles Which Fail Idle Test As Received (24 Vehicles)	
		As Received	After Carb. Maintenance*
Idle Test:			
Average Idle HC (PPM)	248.5	264.8	102.3
Average Idle CO (%)	2.92	3.15	.42
IHC Pass Rate (%)	57.7	54.2	91.7
ICO Pass Rate (%)	15.4	8.3	83.3
Idle Test Pass Rate (%)	7.7	0.0	75.0
Federal Test Procedure:			
Average FTP HC (GM/MI)	2.27	2.39	1.70
Average FTP CO (GM/MI)	38.6	40.9	21.4
Average FTP NO (GM/MI)	2.61	2.63	2.74
FTP HC Pass Rate (%)	38.5	33.3	58.3
FTP CO Pass Rate (%)	26.9	20.8	58.3
FTP NO Pass Rate (%)	69.2	66.7	58.3
FTP Test Pass Rate (%)	11.5	4.2	12.5
Highway Fuel Economy Test:			
Average HFET HC (GM/MI)	.67	.69	.64
Average HFET CO (GM/MI)	9.86	10.53	9.29
Average HFET NO (GM/MI)	3.71	3.66	3.80

* Repairs performed by field mechanics.

Table 10.
Portland Element II Sample
(26 1975-1977 Model Year Vehicles
Which Received Only Carburetor Maintenance)

Average Mileage: 29821 Miles

Idle HC Cutpoint: 300 PPM
Idle CO Cutpoint: 3.0 %

	As Received (26 Vehicles)	Vehicles Which Fail Idle Test As Received (15 Vehicles)	
		As Received	After Carb. Maintenance*
Idle Test:			
Average Idle HC (PPM)	284.5	339.0	128.3
Average Idle CO (%)	2.92	3.95	.41
IHC Pass Rate (%)	73.1	53.3	93.3
ICO Pass Rate (%)	50.0	13.3	100.0
Idle Test Pass Rate (%)	42.3	0.0	93.3
Federal Test Procedure:			
Average FTP HC (GM/MI)	2.27	2.65	1.69
Average FTP CO (GM/MI)	38.6	40.1	16.9
Average FTP NO (GM/MI)	2.61	2.38	2.75
FTP HC Pass Rate (%)	38.5	20.0	60.0
FTP CO Pass Rate (%)	26.9	26.7	66.7
FTP NO Pass Rate (%)	69.2	73.3	53.3
FTP Test Pass Rate (%)	11.5	6.7	6.7
Highway Fuel Economy Test:			
Average HFET HC (GM/MI)	.67	.73	.61
Average HFET CO (GM/MI)	9.86	8.44	6.90
Average HFET NO (GM/MI)	3.71	3.25	3.65

* Repairs performed by field mechanics.

Table 11.
Portland Element III Sample
(55 1975-1977 Model Year Vehicles
Which Received Only Carburetor Maintenance)

Average Mileage: 37732 Miles

Idle HC Cutpoint: 225 PPM
Idle CO Cutpoint: 1.0 %

	As Received (55 Vehicles)	Vehicles Which Fail Idle Test As Received (48 Vehicles)	
		As Received	After Carb. Maintenance*
Idle Test:			
Average Idle HC (PPM)	287.2	321.4	101.5
Average Idle CO (%)	3.71	4.22	.40
IHC Pass Rate (%)	58.2	58.3	93.8
ICO Pass Rate (%)	18.2	6.3	85.4
Idle Test Pass Rate (%)	12.7	0.0	79.2
Federal Test Procedure:			
Average FTP HC (GM/MI)	2.48	2.66	1.60
Average FTP CO (GM/MI)	37.2	40.6	18.4
Average FTP NO (GM/MI)	2.54	2.36	2.47
FTP HC Pass Rate (%)	30.9	20.8	54.2
FTP CO Pass Rate (%)	18.2	12.5	54.2
FTP NO Pass Rate (%)	72.7	77.1	68.8
FTP Test Pass Rate (%)	10.9	8.3	31.3
Highway Fuel Economy Test:			
Average HFET HC (GM/MI)	.68	.70	.48
Average HFET CO (GM/MI)	9.21	9.61	6.34
Average HFET NO (GM/MI)	3.71	3.41	3.49
Federal 3-Mode Test:			
High Cruise HC (PPM)	63.8	65.2	53.2
High Cruise CO (%)	.373	.377	.275
High Cruise NO (PPM)	1473	1387	1309
Low Cruise HC (PPM)	100.3	106.2	70.4
Low Cruise CO (%)	.720	.792	.333
Low Cruise NO (PPM)	956	883	909

* Repairs performed by field mechanics.

Table 12.
Portland Element III Sample
(55 1975-1977 Model Year Vehicles
Which Received Only Carburetor Maintenance)

Average Mileage: 37732 Miles

Idle HC Cutpoint: 300 PPM
Idle CO Cutpoint: 3.0 %

	As Received (55 Vehicles)	Vehicles Which Fail Idle Test As Received (36 Vehicles)	
		As Received	After Carb. Maintenance*
Idle Test:			
Average Idle HC (PPM)	287.2	381.1	108.2
Average Idle CO (%)	3.71	4.98	.46
IHC Pass Rate (%)	67.3	50.0	97.2
ICO Pass Rate (%)	40.0	8.3	100.0
Idle Test Pass Rate (%)	34.5	0.0	97.2
Federal Test Procedure:			
Average FTP HC (GM/MI)	2.48	3.01	1.70
Average FTP CO (GM/MI)	37.2	46.3	19.6
Average FTP NO (GM/MI)	2.54	2.34	2.41
FTP HC Pass Rate (%)	30.9	11.1	47.2
FTP CO Pass Rate (%)	18.2	5.6	44.4
FTP NO Pass Rate (%)	72.7	77.8	69.4
FTP Test Pass Rate (%)	10.9	2.8	25.0
Highway Fuel Economy Test:			
Average HFET HC (GM/MI)	.68	.77	.51
Average HFET CO (GM/MI)	9.21	10.53	7.08
Average HFET NO (GM/MI)	3.71	3.35	3.31
Federal 3-Mode Test:			
High Cruise HC (PPM)	63.8	70.0	57.2
High Cruise CO (%)	.373	.414	.294
High Cruise NO (PPM)	1473	1387	1304
Low Cruise HC (PPM)	100.3	122.4	77.4
Low Cruise CO (%)	.720	.992	.406
Low Cruise NO (PPM)	956	867	866

* Repairs performed by field mechanics.

Table 13.
Portland Element II Sample
(62 1972-1974 Model Year Vehicles)

Average Mileage: 53735 Miles

Idle HC Cutpoint: 225 PPM
Idle CO Cutpoint: 1.0 %

	As Received (62 Vehicles)	Vehicles Which Fail Idle Test As Received (62 Vehicles)	
		As Received	After Maintenance*
Idle Test:			
Average Idle HC (PPM)	406.7	406.7	199.3
Average Idle CO (%)	4.51	4.51	.95
IHC Pass Rate (%)	38.7	38.7	75.8
ICO Pass Rate (%)	9.7	9.7	61.3
Idle Test Pass Rate (%)	0.0	0.0	50.0
Federal Test Procedure:			
Average FTP HC (GM/MI)	4.07	4.07	3.12
Average FTP CO (GM/MI)	55.7	55.7	32.7
Average FTP NO (GM/MI)	3.22	3.22	3.31
FTP HC Pass Rate (%)	51.6	51.6	82.3
FTP CO Pass Rate (%)	22.6	22.6	72.6
FTP NO Pass Rate (%)	66.1	66.1	69.4
FTP Test Pass Rate (%)	9.7	9.7	45.2
Highway Fuel Economy Test:			
Average HFET HC (GM/MI)	1.97	1.97	1.55
Average HFET CO (GM/MI)	15.95	15.95	12.20
Average HFET NO (GM/MI)	5.34	5.34	5.11

* Repairs performed by field mechanics.

Table 14.
Portland Element II Sample
(62 1972-1974 Model Year Vehicles)

Average Mileage: 53735 Miles

Idle HC Cutpoint: 300 PPM
Idle CO Cutpoint: 3.0 %

	As Received (62 Vehicles)	Vehicles Which Fail Idle Test As Received (53 Vehicles)	
		As Received	After Maintenance*
Idle Test:			
Average Idle HC (PPM)	406.7	452.1	198.2
Average Idle CO (%)	4.51	4.91	.91
IHC Pass Rate (%)	59.7	52.8	84.9
ICO Pass Rate (%)	25.8	13.2	98.1
Idle Test Pass Rate (%)	14.5	0.0	83.0
Federal Test Procedure:			
Average FTP HC (GM/MI)	4.07	4.28	3.22
Average FTP CO (GM/MI)	55.7	56.3	31.8
Average FTP NO (GM/MI)	3.22	3.23	3.38
FTP HC Pass Rate (%)	51.6	50.9	84.9
FTP CO Pass Rate (%)	22.6	22.6	77.4
FTP NO Pass Rate (%)	66.1	67.9	71.7
FTP Test Pass Rate (%)	9.7	9.4	49.1
Highway Fuel Economy Test:			
Average HFET HC (GM/MI)	1.97	2.09	1.63
Average HFET CO (GM/MI)	15.95	15.93	12.55
Average HFET NO (GM/MI)	5.34	5.46	5.28

* Repairs performed by field mechanics.

Table 15.
Portland Element II Sample
(99 1975-1977 Model Year Vehicles)

Average Mileage: 26050 Miles

Idle HC Cutpoint: 225 PPM
Idle CO Cutpoint: 1.0 %

	As Received (99 Vehicles)	Vehicles Which Fail Idle Test As Received (92 Vehicles)	
		As Received	After Maintenance*
Idle Test:			
Average Idle HC (PPM)	329.0	351.2	95.4
Average Idle CO (%)	3.23	3.45	.36
IHC Pass Rate (%)	42.4	38.0	94.6
ICO Pass Rate (%)	19.2	13.0	87.0
Idle Test Pass Rate (%)	7.1	0.0	81.5
Federal Test Procedure:			
Average FTP HC (GM/MI)	2.59	2.70	1.53
Average FTP CO (GM/MI)	37.2	38.9	19.5
Average FTP NO (GM/MI)	2.47	2.49	2.60
FTP HC Pass Rate (%)	31.3	28.3	64.1
FTP CO Pass Rate (%)	24.2	20.7	59.8
FTP NO Pass Rate (%)	73.7	71.7	65.2
FTP Test Pass Rate (%)	11.1	7.6	31.5
Highway Fuel Economy Test:			
Average HFET HC (GM/MI)	.61	.61	.51
Average HFET CO (GM/MI)	8.46	8.61	7.68
Average HFET NO (GM/MI)	3.53	3.48	3.50

* Repairs performed by field mechanics.

Table 16.
Portland Element II Sample
(99 1975-1977 Model Year Vehicles)

Average Mileage: 26050 Miles

Idle HC Cutpoint: 300 PPM
Idle CO Cutpoint: 3.0 %

	As Received (99 Vehicles)	Vehicles Which Fail Idle Test As Received (64 Vehicles)	
		As Received	After Maintenance*
Idle Test:			
Average Idle HC (PPM)	329.0	432.4	99.2
Average Idle CO (%)	3.23	4.15	.31
IHC Pass Rate (%)	55.6	31.3	95.3
ICO Pass Rate (%)	53.5	28.1	100.0
Idle Test Pass Rate (%)	35.4	0.0	95.3
Federal Test Procedure:			
Average FTP HC (GM/MI)	2.59	3.12	1.57
Average FTP CO (GM/MI)	37.2	43.0	19.4
Average FTP NO (GM/MI)	2.47	2.36	2.49
FTP HC Pass Rate (%)	31.3	15.6	60.9
FTP CO Pass Rate (%)	24.2	15.6	59.4
FTP NO Pass Rate (%)	73.7	73.4	62.5
FTP Test Pass Rate (%)	11.1	4.7	26.6
Highway Fuel Economy Test:			
Average HFET HC (GM/MI)	.61	.68	.54
Average HFET CO (GM/MI)	8.46	9.25	8.16
Average HFET NO (GM/MI)	3.53	3.30	3.30

* Repairs performed by field mechanics.

Table 17.
Portland Element III Sample
(108 1975-1977 Model Year Vehicles)

Average Mileage: 35756 Miles

Idle HC Cutpoint: 225 PPM
Idle CO Cutpoint: 1.0 %

	As Received (108 Vehicles)	Vehicles Which Fail Idle Test As Received (100 Vehicles)	
		As Received	After Maintenance*
Idle Test:			
Average Idle HC (PPM)	317.1	338.3	95.2
Average Idle CO (%)	3.80	4.09	.33
IHC Pass Rate (%)	48.1	44.0	94.0
ICO Pass Rate (%)	12.0	5.0	89.0
Idle Test Pass Rate (%)	7.4	0.0	83.0
Federal Test Procedure:			
Average FTP HC (GM/MI)	2.78	2.91	1.55
Average FTP CO (GM/MI)	42.0	44.4	20.8
Average FTP NO (GM/MI)	2.29	2.18	2.40
FTP HC Pass Rate (%)	22.2	16.0	57.0
FTP CO Pass Rate (%)	14.8	11.0	53.0
FTP NO Pass Rate (%)	77.8	80.0	72.0
FTP Test Pass Rate (%)	9.3	7.0	31.0
Highway Fuel Economy Test:			
Average HFET HC (GM/MI)	.85	.88	.51
Average HFET CO (GM/MI)	12.75	13.32	8.67
Average HFET NO (GM/MI)	3.27	3.08	3.29
Federal 3-Mode Test:			
High Cruise HC (PPM)	77.7	79.6	55.8
High Cruise CO (%)	.522	.540	.396
High Cruise NO (PPM)	1285	1226	1190
Low Cruise HC (PPM)	105.8	109.7	64.7
Low Cruise CO (%)	.767	.812	.346
Low Cruise NO (PPM)	844	801	867

* Repairs performed by field mechanics.

Table 18.
Portland Element III Sample
(108 1975-1977 Model Year Vehicles)

Average Mileage: 35756 Miles

Idle HC Cutpoint: 300 PPM
Idle CO Cutpoint: 3.0 %

	As Received (108 Vehicles)	Vehicles Which Fail Idle Test As Received (77 Vehicles)	
		As Received	After Maintenance*
Idle Test:			
Average Idle HC (PPM)	317.1	398.7	101.4
Average Idle CO (%)	3.80	4.70	.34
IHC Pass Rate (%)	58.3	41.6	97.4
ICO Pass Rate (%)	41.7	18.2	100.0
Idle Test Pass Rate (%)	28.7	0.0	97.4
Federal Test Procedure:			
Average FTP HC (GM/MI)	2.78	3.28	1.63
Average FTP CO (GM/MI)	42.0	50.3	22.7
Average FTP NO (GM/MI)	2.29	2.16	2.36
FTP HC Pass Rate (%)	22.2	6.5	51.9
FTP CO Pass Rate (%)	14.8	5.2	45.5
FTP NO Pass Rate (%)	77.8	80.5	72.7
FTP Test Pass Rate (%)	9.3	1.3	26.0
Highway Fuel Economy Test:			
Average HFET HC (GM/MI)	.85	.98	.55
Average HFET CO (GM/MI)	12.75	15.24	10.17
Average HFET NO (GM/MI)	3.27	3.03	3.16
Federal 3-Mode Test:			
High Cruise HC (PPM)	77.7	86.2	60.3
High Cruise CO (%)	.522	.614	.449
High Cruise NO (PPM)	1285	1204	1171
Low Cruise HC (PPM)	105.8	125.9	70.3
Low Cruise CO (%)	.767	1.003	.417
Low Cruise NO (PPM)	844	780	819

* Repairs performed by field mechanics.

Table 19.

Effect of Typical I/M Repairs
on NOx Measurements in Portland
(Repairs performed by field mechanics)

	Element III (1975-1977 Vehicles)		Element II (1975-1977 Vehicles)		Element II (1972-1974 Vehicles)	
Initial Test	Pass (179)	Fail (108)	Pass (123)	Fail (117)	Pass (113)	Fail (95)
FTP NOx (gm/mi)	2.44	2.29	2.62	2.47	3.42	3.15
HFET NOx (gm/mi)	3.49	3.27	3.72	3.52	5.09	5.13
After Maintenance						
FTP NOx (gm/mi)		2.50		2.56		3.25
HFET NOx (gm/mi)		3.45		3.55		4.96
Significance of the Change*						
FTP NOx		.0274		.3070		.2280
HFET NOx		.2143		.7543		.4565

* A value of .05 or less indicates a significant change.

Table 20.

Comparison of NOx Measurements
in the Eugene and Portland Element II Samples
(1972-1974 Vehicles)

Initial Test	N	I/M Area (Portland)	N	Non-I/M Area (Eugene)	Significance of the Difference*
FTP NOx (gm/mi)	219	3.30	113	3.63	.0674
HFET NOx (gm/mi)		5.11		5.41	.2432
1st Quarterly Test					
FTP NOx (gm/mi)	202	3.41	98	3.70	.0877
HFET NOx (gm/mi)		5.04		5.40	.1893
2nd Quarterly Test					
FTP NOx (gm/mi)	197	3.41	93	3.56	.3728
HFET NOx (gm/mi)		4.75		5.18	.0905
3rd Quarterly Test					
FTP NOx (gm/mi)	187	3.34	88	3.53	.3277
HFET NOx (gm/mi)		5.13		5.48	.2416
4th Quarterly Test					
FTP NOx (gm/mi)	174	3.16	80	3.40	.1952
HFET NOx (gm/mi)		5.13		5.10	.9450

* A value of .05 or less indicates a significant difference between the samples.

Table 21.

Comparison of NOx Measurements
in the Eugene and Portland Element II Samples
(1975-1977 Vehicles)

Initial Test	N	I/M Area (Portland)	N	Non-I/M Area (Eugene)	Significance of the Difference*
FTP NOx (gm/mi)	257	2.55	126	2.70	.2755
HFET NOx (gm/mi)		3.63		3.76	.5327
1st Quarterly Test					
FTP NOx (gm/mi)	235	2.61	113	2.73	.4257
HFET NOx (gm/mi)		3.64		3.85	.3664
2nd Quarterly Test					
FTP NOx (gm/mi)	221	2.58	95	2.53	.7501
HFET NOx (gm/mi)		3.46		3.37	.6992
3rd Quarterly Test					
FTP NOx (gm/mi)	209	2.56	78	2.72	.3315
HFET NOx (gm/mi)		3.74		3.72	.9368
4th Quarterly Test					
FTP NOx (gm/mi)	199	2.46	75	2.51	.7837
HFET NOx (gm/mi)		3.74		3.71	.9039

* A value of .05 or less indicates a significant difference between the samples.

Table 22.

Comparison of NOx Measurements
in the Eugene and Portland Element III Samples
(1975-1977 Model Years)

Initial Test	N	I/M Area (Portland)	N	Non-I/M Area (Eugene)	Significance of the Difference*
FTP NOx (gm/mi)	292	2.40	126	2.70	.0356
HFET NOx (gm/mi)		3.44		3.76	.1130
1st Quarterly Test					
FTP NOx (gm/mi)	276	2.44	113	2.73	.0562
HFET NOx (gm/mi)		3.31		3.85	.0112
2nd Quarterly Test					
FTP NOx (gm/mi)	258	2.45	95	2.53	.6135
HFET NOx (gm/mi)		3.23		3.37	.5250
3rd Quarterly Test					
FTP NOx (gm/mi)	229	2.52	78	2.72	.2494
HFET NOx (gm/mi)		3.73		3.72	.9530
4th Quarterly Test					
FTP NOx (gm/mi)	228	2.55	75	2.51	.8070
HFET NOx (gm/mi)		3.61		3.71	.6931

* A value of .05 or less indicates a significant difference between the samples.

Table 23.

Significance of Changes in the NOx Measurements Between Quarterly Tests in Oregon

	Init/1st Quarter*	1st Quarter/2nd Quarter*	2nd Quarter/3rd Quarter*	3rd Quarter/4th Quarter*
Portland Element III (1975-1977 Vehicles)				
FTP NOx	.3317	.0702	.0594	.3910
HFET NOx	.1298	.7773	.0000	.2371
Portland Element II (1972-1974 Vehicles)				
FTP NOx	.0622	.5678	.1017	.0023
HFET NOx	.5553	.0001	.0002	.9346
Portland Element II (1975-1977 Vehicles)				
FTP NOx	.4480	.3618	.8231	.0122
HFET NOx	.9076	.0026	.0015	.7325
Eugene Sample (1972-1974 Vehicles)				
FTP NOx	.8758	.0695	.5480	.1745
HFET NOx	.9540	.1206	.0310	.0274
Eugene Sample (1975-1977 Vehicles)				
FTP NOx	.6537	.0075	.0104	.0249
HFET NOx	.8963	.0017	.0190	.9208

* A value of .05 or less indicates a significant difference between the samples.